

## ABSTRACT OF THE DISCLOSURE

An apparatus and method for blood oxygenation is provided, advantageously comprising an extracorporeal circuit for the preparation and delivery of hyperoxic or hyperbaric blood. In one embodiment, an apparatus for gas-supersaturating fluids, e.g., physiologic saline, includes a chamber having a first inlet to receive the fluid; a second inlet to receive a gas, e.g., oxygen, from a gas supply that maintains pressure within the chamber at a predetermined level, advantageously about 600 p.s.i.; and an outlet advantageously coupled to a capillary assembly. An atomizer nozzle coupled to the first inlet advantageously creates within the chamber fine droplets of fluid into which gas diffuses to create the gas-supersaturated fluid, which collects within the chamber below the atomizer nozzle for removal via the outlet. The removed gas-supersaturated fluid mixes with blood provided by a blood pump, the mixing occurring within a liquid-to-liquid oxygenation assembly including a pressurizable chamber having inlets for the gas-supersaturated fluid and blood, the inlets advantageously arranged to create a vortical or cyclonic fluid flow within the chamber to promote mixing. The mixed fluid exits the chamber via an outlet for delivery to a patient (e.g., sub-selective delivery) or other site via a catheter, infusion guidewire, or other interventional fluid delivery device, the mixed fluid advantageously comprising blood having increased oxygen levels, i.e., oxygenated blood. Alternately, the blood may be provided by the pump to a high pressure hollow fiber or other type membrane oxygenator within which oxygen, advantageously provided at a pressure greater than atmospheric, diffuses across the membrane(s) and into the blood to form oxygenated blood, again for delivery to a patient or other site. Advantageously, the oxygenated blood is delivered at a target  $pO_2$  greater than about 760 mm Hg and is delivered from the liquid-to-liquid oxygenation assembly or membrane oxygenator via a fluid conduit having an approximate pressure drop greater than the target  $pO_2$ .